Father Convict Cichlids Bite Intruders More Often in Hot Temperatures

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BACKGROUND:

Convict cichlids are found in freshwaters of Central America. They are substrate spawners that lay their eggs on the inside walls of a cave. The parents defend the eggs, subsequent hatchlings, and fry from predators. The amount of care they provide depends on many factors (e.g., the number of offspring, size of the parents, etc.). Previously, I showed that mother convict cichlids are much more aggressive in warmer water than cold water. Our goal was to determine if this increased aggressive activity resulted in greater defense of the offspring at warmer temperature with the father as the sole parent rather than the mother.

METHODS:

Pairs of convict cichlids were placed in separate 76-liter aquaria with a set temperature of 26° Celsius to allow for spawning. Once spawning had occurred inside the small clay flowerpot (used to resemble a cave dwelling), the pot was extracted from the tank. The eggs were counted and reduced to a constant number of 100. The flowerpot was placed back into the tank and the female was relocated to a different holding vessel so that the male was left to raise the remaining brood alone. Once the eggs became fry, the temperature was dropped to the low temperature (23° C) for testing the next day.

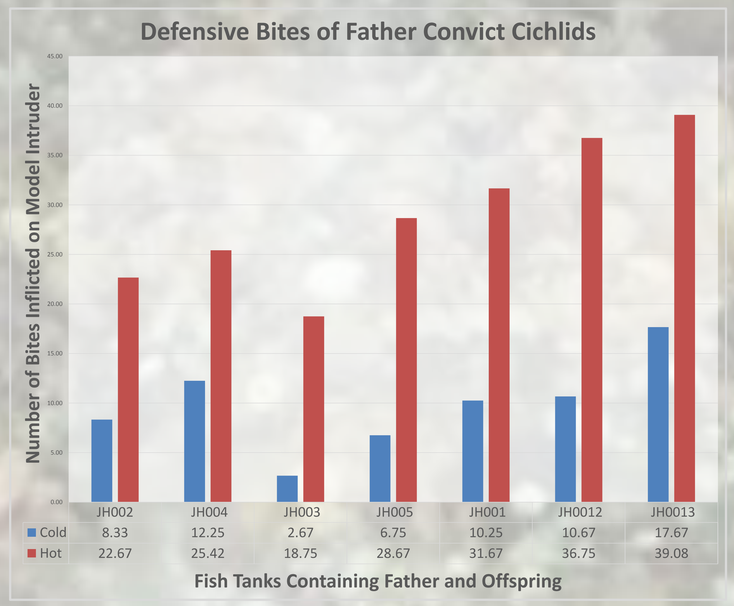
Testing included:

- Moving a model intruder fish attached to a rod in a figure eight motion for 30 seconds, counting his bites on the model
- Waiting 30 seconds
- Counting bites for another 30 seconds
- Waiting 5 minutes
- Counting bites for another 30 seconds
- Waiting 30 seconds again
- Then counting bites one last time

After this sequence of testing for the day, the temperature was raised to the high temperature (29° C) for the same testing procedure to occur the following day in the new temperature. This was administered until a total of 3 cold and 3 hot sequences were recorded for that particular tank. Other pairs were subjected to the high temperature first.

DISCUSSION:

The data shows that male convict cichlids demonstrate higher parental aggression in warmer water than in cold water. This is consistent with the previous finding that mother convict cichlids are more aggressive, in general, in warmer water. Clearly temperature affects parental care and must be factored into future experiments on parental care.



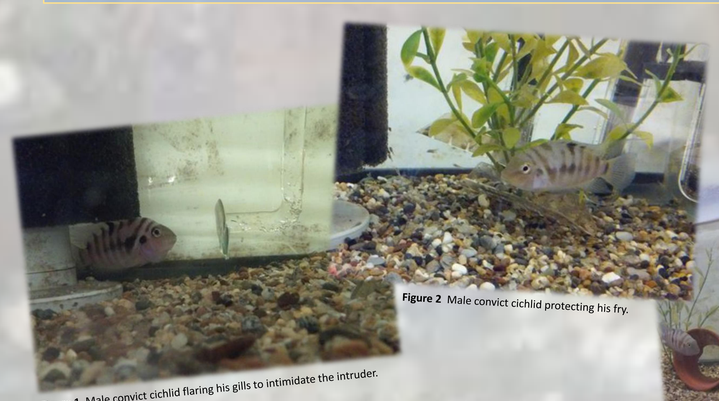


Figure 1 Male convict cichlid flaring his gills to intimidate the intruder.

Figure 2 Male convict cichlid protecting his fry.

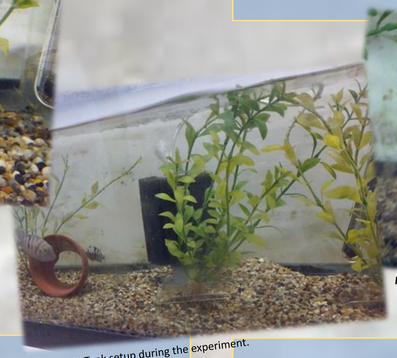


Figure 3 Tank setup during the experiment.

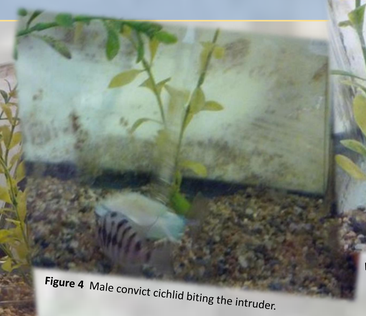


Figure 4 Male convict cichlid biting the intruder.

Figure 5 Male convict cichlid taking over the job of fanning the brood.

HYPOTHESIS:

We proposed that male convict cichlids will produce an increased number of bites toward a model intruder in the hot water (29° C) versus cold water (23° C).

RESULTS:

After performing a paired t-test on the number of bites inflicted upon an intruder fish model, we found a significant difference in the number of bites committed in the warmer water than the cold water. The paired t-test revealed that the male convicts defended their offspring with greater aggression in the hot water compared to the cold water (One-paired t-test; $t=10.7$, $df=6$, $p<0.01$).

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